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NAVAL CENTER FOR COST ANALYSIS  
DEPARTMENT OF THE NAVY  
WASHINGTON, D.C. 20350-1100  
SOFTWARE COST ESTIMATION STUDY  
FINAL REPORT DOCUMENTATION SUMMARY  
August, 1990

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Prepared by:  
Dr. Aaron N. Silver

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**FINAL REPORT**

**DOCUMENTATION SUMMARY**

**August, 1990**

**Prepared for**

**NAVAL CENTER FOR COST ANALYSIS  
DEPARTMENT OF THE NAVY  
WASHINGTON, D.C. 20350-1100**

**Under Contract N00014-85-C-0892  
Delivery Order No. MCR-90-523  
(OFFICE OF NAVAL RESEARCH (ONR))**

**FINAL REPORT DOCUMENTATION SUMMARY**

**by**

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## DOCUMENTATION SUMMARY

### INTRODUCTION

The documentation described in this summary refers to both reports and software products, i.e., computer prototype programs, generated during the entire "Software Cost Estimation Study". The period of performance covered is from 2 January 1986 to 31 August 1990. During this time frame, both the Naval Center for Cost Analysis (under the auspices of the office of Naval Research) and the Air Force Center for Cost Analysis funded several additional "enhancements" to the program, which resulted in producing the Software Architecture Sizing, and Estimating Tool (SASET). These specific enhancements along with the initial "Software Cost Estimation Study" comprise the overall scope of this investigation. (KR)

Several CDRL sequences were established by Martin Marietta Denver Astronautics (MMDA) contracts to monitor and track all contract deliverables. These were given the designation A00X, B00X, C00X, D00X and E00X and refer to both Air Force and Navy Enhancements. The basic chronological order for these software products and documentation is given in terms of the Contract Data Requirements List (CDRL).

- CDRL - A001      Quarterly Status Reports, issues 1 through 9, covering the period 2/86 to 12/88.  
(Transmittal letter references 1814, 2097, 2410, 1718, 1919, 2165, 1514, 1818, and final report including Revision 1.0 dated September, 1989).
- CDRL - A002      Management plan, delivered prior to contract go-ahead on 12/13/85.  
(Transmittal letter reference 0709).
- CDRL's - A003 - A009      These CDRL items refer to the reports and software products generated during the performance period 1/8/86 to 8/5/88, and comprise the basic SASET methodology.  
(Transmittal letter references 1813, 2020, 2411, 1719, 2045, 2312, and 1965).

CDRL - A010	Final Report dated July, 1988 and revised in September, 1989 (Revision 1.0). (Transmittal letter references 2058 and 1635).
CDRL - A011	SASET Software, computer program prototype which included all demonstration and interim computer discs produced (source code). (Transmittal letter reference 1521).
CDRL - A012	SASET User's Manual, delivered on 2/24/89 and updated on 5/29/90. (Transmittal letter references 1637 and 1809).
CDRL - A013	SASET Calibration Enhancement (for Air Force) (Transmittal letter reference 1638).
CDRL - B001	SASET Tutorial Enhancement (for Navy). Quarterly Status Reports, issues 1 through 5 (included in A001 during period 11/88 to 3/89).
CDRL - B011	SASET Tutorial Software (Computer Program Prototype delivered 1/17/89) (Transmittal letter reference 1521).
CDRL - B012	SASET Tutorial Internal Review
CDRL - B013	SASET User's Manual Update (included Tutorial Enhancement) delivered 5/24/89. (Transmittal letter reference 1809).
CDRL - B014	Modified Source Code (to be submitted with final report).
CDRL - C001	SASET Multiple CPCI Enhancement (for Air Force), Quarterly Status Reports, issues 1 through 4, covering the performance period 8/10 to 2/22/90. (Transmittal letter references 1956, 2078, 2217, 1599).

CDRL - C002	SASET Multiple CPCI Software (Computer Program Prototype) (Transmittal letter reference 1601).
CDRL - C003	SASET User's Manual for Multiple CPCI Enhancement (Transmittal letter reference 1506).
CDRL - C004	Final Report for Multiple CPCI Enhancement (Transmittal letter reference 1098).
CDRL - D001	SASET Performance Measurement Enhancement (for Air Force), Quarterly Status Report issues 1 through 5, covering period of performance 12/15/89 to 8/21/90.
CDRL - D002	SASET Performance Measurement Software (Computer Program Prototype) delivered 8/31/90 (Transmittal letter reference 1824).
CDRL - D003	SASET User's Manual Update (update to include performance measurement).
CDRL - E001	SASET Risk Assessment Enhancement (for Navy), Quarterly Status Reports, issues 1 through 5, covering period of performance 11/20/89 to 7/20/90. (Transmittal letter references 1598, 1625, 1637).
CDRL - E002	Risk Assessment Software (Computer Program Prototype) delivered 3/20/90 (Transmittal letter reference 1637).
CDRL - E003	SASET User's Manual Update (updated to include risk assessment and all prior enhancements).

## II. DOCUMENT LISTING

In accordance with the CDRL sequence established in the previous section, the following reports and software products generated during the entire "Software Cost Estimation Study" (including all enhancements) provide the essential basis for understanding the SASET model and methodology.

### **A. *Series A00X CDRL Sequence Documents***

- (1) "Lessons Learned Report," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-86-508, CDRL Item No. A003, April, 1986 (Martin Marietta Corporation Publication R-0420-86-1).
- (2) "Cost Drivers Report," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-86-509, CDRL Item No. A004, June, 1986 (Martin Marietta Corporation Publication R-0420-86-2).
- (3) "CER Methodology Prototype Report," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-86-510, CDRL Item No. A005, October, 1986 (Martin Marietta Corporation Publication R-0420-86-6).
- (4) "CER Model Planning Report" Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-87-538, CDRL Item No. A006, April, 1987 (Martin Marietta Corporation Publication R-0420-87-1).
- (5) "CER Model Baseline Report" Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-87-563, CDRL Item No. A007, September, 1987 (Martin Marietta Corporation Publication R-0420-87-3).

- (6) "CER Model Cost to Complete Report" Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-87-564, CDRL Item No. A008, December, 1987 (Martin Marietta Corporation Publication R-0420-87-4).
- (7) "Total Life Cycle CER's Report," also entitled, "Software User's Guide," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-88-582, CDRL Item No. A009, August, 1988 (Martin Marietta Corporation Publication R-0420-88-2).
- (8) "Final Report" Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-88-597, CDRL Item No. A010, September, 1988 (Martin Marietta Corporation Publication R-0420-88-3).
- (9) "SASET Software Model" (Computer prototype program) Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-88-632, CDRL Item No. A011, February, 1989.
- (10) "SASET User's Manual," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-88-633, CDRL Item No. A012, February, 1989 (Martin Marietta Corporation Publication R-0420-89-1).
- (11) "SASET Calibration Enhancement," Software Cost Estimation Study, funded by Air Force Cost Center in conjunction with the Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-88-634, CDRL Item No. A013, February, 1989

The following SASET "Requirements Document" was not specified as a CDRL item. However, it is included in the total SASET documentation for the sake of completeness.

- (12) "Requirements and Preliminary Design Specification," Software Architecture, Sizing and Estimating Tool, Naval Center for Cost Analysis, Contract No.

N00014-85-C-0892, August 1987 (Martin Marietta Corporation Publication R-0420-87-1-Revision #5).

**B.     *Series B00X CDRL Sequence Documents and Software***

The following documents comprise the "Tutorial Enhancement" funded by the Naval Center for Cost Analysis and encompasses the performance period from December, 1988 through February, 1989.

- (13)    SASET Tutorial Software (Computer program prototype), Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-88-632, CDRL Item No. B011, January, 1989. (This software was considered part of the SASET Software Model, referenced in CDRL Item No. A011).
- (14)    SASET Tutorial Software Review (computer program prototype) was conducted on 12/1/88, and formally specified as CDRL Item No. B012.
- (15)    "SASET User's Manual," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery order No. MCR-88-633, CDRL Item No. B013, May, 1989. (This update included the tutorial enhancement referenced in CDRL Item No. A012).
- (16)    SASET Modification Source Code (computer program prototype) to be submitted with the final contract CDRL Item, as Delivery order No. MCR-90-541.

**C.     *Series C00X CDRL Sequence Documents and Software***

The following documents and software prototype computer program deliverables comprise the "Multiple CPCI Enhancement" funded by the Air Force Cost Center, and encompass the performance period from August 1989 through February 1990.

(The Quarterly Status reports for the Multiple CPCI Enhancement are designated as CDRL Item C001, issues 1 through 4, Delivery Order No. MCR-89-582).



- (17) SASET Multiple CPCI Software (computer program prototype), Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-90-505, CDRL Item No. C002, March, 1990.
- (18) "SASET User's Manual," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-90-506, CDRL Item No. C003, March, 1990. (This update included documentation modification to all previous enhancements referenced in CDRL Item No. B013, and CDRL Item No. A012).

**D. *Series D00X CDRL Sequence Documents and Software***

The following documents and software prototype computer program deliverables comprise the "Performance Measurement Enhancement," funded by the Air Force Cost Center, and encompasses the performance period from December 1989 through August, 1990.

(The Quarterly Status Reports for the Performance Measurement Enhancement are designated as CDRL Item D001, issues 1 through 4, Delivery Order No. MCR-90-514).

- (19) SASET Performance Measurement Software (computer program prototype), Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-90-515, CDRL Item No. D002, August, 1990.
- (20) "SASET User's Manual," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-C-0892, Delivery Order No. MCR-90-521, CDRL Item No. D003, August, 1990. (This update included documentation modifications to all previous enhancements referenced in CDRL Item No. C003, CDRL Item No. B013, and CDRL Item No. A012).

***E      Series E00X CDRL Sequence Documents and Software***

The following documents and software prototype computer program deliverables comprise the "Risk Assessment Enhancement," funded by the Naval Center for Cost Analysis, and encompasses the performance period from July 1989 through August, 1990.

(The Quarterly Status Reports for the Risk Assessment Enhancement are designated as CDRL Item E001, issues 1 through 4, Delivery Order No. MCR-90-520).

- (21) SASET Risk Assessment Software (computer program prototype), Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00019-85-0892, Delivery Order No. MCR-90-522, CDRL Item No. E002, March 1990.
- (22) "SASET User's Manual," Software Cost Estimation Study, Naval Center for Cost Analysis, Contract No. N00014-85-0892, Delivery Order No. MCR-90-523, CDRL Item No. E003, March 1990. (This update included document modifications to all previous enhancements referenced in CDRL Item No. D003, CDRL Item No. C003, CDRL Item No. B013, and CDRL Item No. A012).